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## ANTHROPOMETRY OF THE SIOUAN TRIBES

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The material is the result of investigations made on the occasion of the World's Columbian Exposition in Chicago in 1893 under the supervision of Professor Franz Boas. The measurements and observations were made by Franz Boas, F. C. Smith, J. W. Cooke, G. A. Kaven, Z. T. Daniels, E. F. Wilson, C. A. Helvin, F. C. Kenyon and G. M. West. The series contains male and female children and adults and includes a large series of half-bloods as well as full-bloods. The total series deals with 1431 individuals which makes it particularly valuable from a statistical point of view. Of this 1431, 594 were male adult full-bloods, 77 were male adult half-bloods, 181 were female adult full-bloods and 19 were female adult half-bloods. The remainder of the series are children.

Individuals from the following bands or tribes representing sub-divisions of the closely allied Siouan Indians were included in the series: Santee, Wahpeton, Sisseton, Yankton, Yanktonai, Cut Head, Teton, Brulé, Loafer, Oglala, Waziahzhia, Sans Arc, Blackfoot Sioux, Minneconjou, Two Kettle, Hunkpapa and Assiniboine. In the larger adult male series each of these bands was represented on the average by about 30 men. The material was first studied by local bands, but so close an agreement was found in all the principal measurements and characteristics that it seemed preferable to include them all in one large series. The result is a fairly homogeneous group with a variability slightly below civilized groups in most characteristics.

Fourteen measurements were taken from which were calculated eight indices. Detailed observations were also made on the hair, skin, eyes, nose, ears, etc.

The series is of interest from two points of view: first, from the point of view of accurately describing and defining the Siouan type and showing its relationship to those American Indian tribes already described, and secondly from the point of view of racial intermixture since we have in this series individuals representing the results of the intermixture of two widely separated races of mankind.

On the first point, we may say that the Sioux with an average male stature of 1724 mm., are among the very tallest of the American Indians who range in stature from the 1530 mm. of the Guarani of South America to the 1750 mm. of the Maricopa and Cheyenne. In head form they are mesocephalic with an index of 79.6. The face is very wide and high, 149.1 and 124.6 mm., respectively. On the average the face is nearly as wide as the head. The average proportion is 96.1%. The nasal bridge is rather high. The hair, of course, is straight and black, the eyes dark

brown, and the skin shows varying shades of brown. The beard, moustache and body hair is poorly developed.

Comparative material for estimating the affinities of the Siouan tribes is not abundant. In nearly every measurement and index the averages for our series are in very close agreement with the Chippewa (Ojibway) series of Hrdlicka. Less detailed results of Boas suggest a uniformity of type with a majority of the Plains tribes (Blackfoot, Cheyenne, Arapaho, Crow, Pawnee) and less certainly with the Micmac, Abenaki, Delaware, Iroquois, Ottawa, and Menomini.

The half-bloods in the series are for the most part the results of the inter-marriage of French, Scotch, Irish, and English men with Indian women. In the study of skin, hair, and eye color the tests were not sufficiently sensitive to bring out any clear cut and certain differences between the full-bloods and half-bloods, if such differences exist. In all of these characters the half-bloods seem to stand very close to the full-bloods. In regard to the amount of hair on the face (beard and moustache) the half-bloods stand intermediate between the Indians and whites.

The anthropometric characters bring out two points of interest: First, that in general body form and proportions the Sioux Indians are not very different from the whites with whom they have mixed. There are practically no differences between the full-bloods and half-bloods in absolute or relative shoulder height, shoulder width, sitting height, arm length, arm reach, and very small differences in the cephalic, facial, and nasal indices. Second, by far the most noticeable and consistent differences are differences in absolute size. The half-bloods are taller than the full-bloods. On the other hand, the full-bloods have the more massive heads, faces, and noses. While the relation of these diameters, as expressed by indices, are very much alike, the absolute diameters are different. The most marked difference is in the width of face. The full-bloods have a much wider face than the half-bloods or whites. The height of the face of full-bloods is also greater and the area of the face much larger than in the half-bloods. It seems that in all those characters in which the Indian differs most markedly from the whites, the half-bloods stand nearer to the Indians than to the whites.

In our present investigation we found the half-bloods more variable than the full-bloods in stature, shoulder height, sitting height, head length, face width, cephalo-facial index, facial index and nasal index. In the remaining twelve of the twenty-one observations the full-bloods were slightly more variable. But in nearly every seriation the distribution among the half-bloods was more irregular.

In our correlations we found the closest relationships to exist between diameters in the same axis such as stature and arm reach, stature and arm length, stature and sitting height, and width of head and width of face. A fair degree of correlation exists between gross diameters in opposite

axes such as stature and width of shoulder. Other diameters in different axes, such as length and width of head, height and width of face, and height and width of nose show a lower degree of correlation. The differences in degree of correlation of two diameters between full-bloods and half-bloods are not very great. On the whole, it does not seem as if inter-mixture had seriously affected the degree of correlation. In the instance of face width and head width the correlation seems to be increased in the half-bloods.

The distribution of face width among the one-fourth Indians, two-fourths Indians, one-half Indians, and three-fourths Indians indicates that the inheritance is alternating. The mixed individual tends to inherit either the Indian or European type of face, intermediate types being of relatively rare occurrence. A high degree of correlation between width of face and width of head was found in the mixed group. Individuals with a narrow head had a tendency to inherit also the narrow face and vice versa. A summary of the anthropometric results will be found in table I and of the correlations in table II.

A detailed report will be published in the *Anthropological Papers of the American Museum of Natural History*, vol. 23, part 3.

TABLE I  
SUMMARY OF THE ANTHROPOMETRIC RESULTS  
MALE ADULT FULL-BLOOD AND HALF-BLOOD SIOUX INDIANS

CHARACTER	AVERAGE		STANDARD DEVIATION ( $\sigma$ )		COEFFICIENT OF VARIABILITY (v)	
	Full-bloods	Half-bloods	Full-bloods	Half-bloods	Full-bloods	Half-bloods
Number of Cases.....	540	77	540	77	540	77
Stature.....	172.4	173.5	5.64	6.81	3.27	3.92
Shoulder Height.....	142.7	142.3	5.03	6.07	3.52	4.26
Shoulder Width.....	38.8	38.9	1.92	1.89	4.94	4.83
Index Shoulder Width.....	22.5	22.4	1.10	1.01	4.88	4.51
Sitting Height.....	88.5	89.6	3.50	4.39	3.95	4.89
Index Sitting Height.....	51.4	51.6	1.68	1.94	3.26	3.76
Arm Reach.....	181.4	182.2	7.03	6.99	3.87	3.83
Index Arm Reach.....	105.2	105.0	2.41	2.19	2.29	2.09
Arm Length.....	77.0	77.3	3.57	3.28	4.64	4.24
Index Arm Length.....	44.6	44.6	1.47	1.26	3.29	2.82
Head Length.....	194.9	194.4	6.16	7.12	3.16	3.66
Head Width.....	155.1	154.3	5.39	5.04	3.47	3.26
Cephalic Index.....	79.6	79.4	3.20	2.64	4.03	3.33
Face Width.....	149.1	143.4	5.45	5.49	3.65	3.83
Cephalo-Facial Index.....	96.1	92.9	3.22	3.23	3.35	3.48
Anatomical Face Height.....	124.6	121.5	6.39	6.36	5.12	5.23
Anatomical Face Index.....	83.6	84.8	4.84	5.28	5.78	6.22
Nasal Height.....	58.3	54.9	3.94	3.55	6.75	6.48
Nasal Width.....	39.9	37.6	3.22	3.04	8.07	8.08
Nasal Index.....	68.8	69.2	7.05	7.08	7.05	7.08

TABLE 2  
CORRELATIONS IN THE MALE ADULT SERIES

CORRELATED MEASUREMENTS	COEFFICIENTS OF CORRELATION	
	540 Full-bloods	77 Half-bloods
Stature and Sitting Height.....	0.61	0.65
Stature and Width of Shoulder.....	0.35	0.48
Stature and Arm Reach.....	0.81	0.85
Stature and Length of Arm.....	0.70	0.76
Length and Width of Head.....	0.27	0.54
Width of Head and Width of Face...	0.55	0.51
Anatomical Height and Width of Face	0.16	0.08
Height and Width of Nose.....	0.05	0.02

*TRANSMISSION OF EYE-DEFECTS INDUCED IN RABBITS BY  
MEANS OF LENS-SENSITIZED FOWL-SERUM*

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As the work progresses it is becoming increasingly evident that the discoveries made in the field of serology all have their broader biological aspects, and that they afford new methods of attacking certain fundamental biological problems. Not the least of these is a possible method of breaching the wall which has gradually come to surround the long-standing problem of provoking specific modifications in the germ-cell through the direct action of external agencies, or indirectly, through changes produced in the parental body. For if external influences *can* be transmitted to the germ-cell, the one obvious means of conveyance in higher animals is the blood, and when one considers the protean possibilities which modern work has revealed in the blood, it is certainly a rational quest to seek in this medium a possible means of altering the germ. To set the problem more specifically, if a serum of one species of animal can be so sensitized to a given tissue or tissues of another species that it will become toxic or lytic for the tissue in question, may it not be that there is sufficient constitutional identity between the mature substance of the tissue and at least some of its material antecedents in the germ, that the latter may also be influenced specifically by the sensitized serum? Or may not changes in its own tissues originate antibodies in the blood serum of a given individual which will not only react with the tissue elements themselves but with their correlatives in the germ cells?

In an attempt to find answers to these and kindred questions we have been engaged in series of experiments which have extended over a period